

NAVY AREA-WIDE RESTORATION ADVISORY BOARD
MEETING MINUTES
HYATT REGENCY GUAM BALLROOM
APRIL 3, 2003, 7P.M.

LCDR Tom Scheuermann, the Navy's Co-Chair, and Mike Gawel, community Co-Chair, opened the meeting and welcomed the group, explaining that the purpose of the Restoration Advisory Board (RAB) was to communicate environmental issues of the Installation Restoration Program and receive public input. At the last meeting, it was agreed to provide some additional training to the group, so this would be the agenda for this evening's meetings.

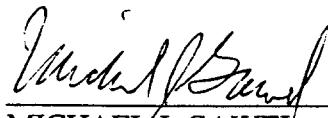
Melissa Forrest from the Navy's Environmental Health Center in Portsmouth, VA provided training on Human Health Risk Assessment, one of many tools for environmental managers. She explained that it is designed to be protective of human health and the environment and that there must be a completed pathway for a risk to exist.

Mr. William Major from the Naval Facilities Engineering Service Center in Port Hueneme, CA explained the various options and process for Remedy Selection for Landfills.

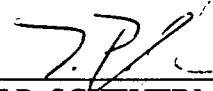
Various questions were fielded, and handouts were made available.

The next RAB Meeting will be held on June 19, 2003.

Approved by:



MICHAEL J. GAWEL
Community Co-Chairperson



T.P. SCHEUERMANN, LCDR, CEC, USN
Navy Co-Chairperson

ATTENDEES:

Arcy M. Castillo
Wendy Chen
Gary Denton
Julianne Duwel
Francis V. N. Epres
Melissa Forest
Isabel Gawel
Mike Gawel
Warren Hall
Theresa Hormillon
Clint Huntington
Troy Imamura
Blaise Koki

Walter Leon Guerrero
Mike O'Mallan
Julie Overturf
Michael Pascua
Alpino Pickey
Eugene Santos
Vicente Santos
Tom Scheuerman
Carmen Sian-Denton
Roy Tsutsui
Nani Ventura
William W. Weare
Michael Wolfram

Introduction

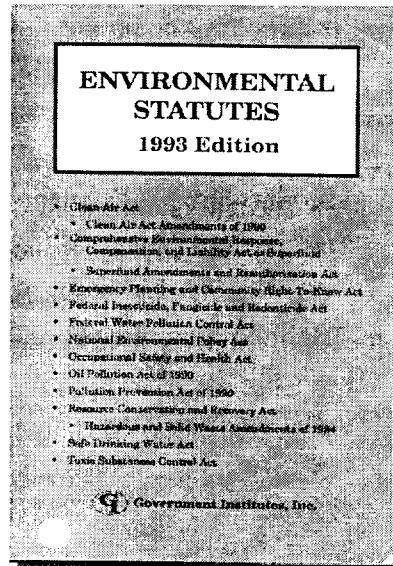
- The objective of this presentation is to provide a general overview of the remediation process for Landfills
- Navy policy regarding environmental cleanup is to protect human health and the environment in the most cost effective manner
- Many factors contribute to the decision-making process...

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Regulatory Framework

Two Primary Environmental Statutes Provide Framework

- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) – a.k.a. Superfund
- Resource Conservation and Recovery Act (RCRA)



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Summary

- Landfills are environmentally complex due to volume and variety of wastes
- Containment is the EPA Presumptive Remedy for Landfills:
 - ◆ Most common remedial approach for landfills
 - ◆ Typically the best approach based on evaluation of performance data from other sites
- Containment requires significant engineering evaluation and design
- Containment achieves goals for protection of human health and the environment and complies with federal and state environmental regulations

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Online Information Resources

- Naval Facilities Engineering Service Center (NFESC)
<http://enviro.nfesc.navy.mil/erb/>
- Federal Remediation Technologies Roundtable (FRTR)
<http://www.frtr.gov>
- EPA Presumptive Remedy for CERCLA Municipal Landfill Sites
<http://www.epa.gov/oerrpage/superfund/resources/presump/clms.htm>

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HUMAN HEALTH RISK ASSESSMENT

Melissa Forrest

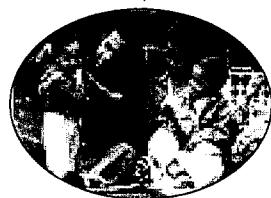
EP Protecting Human Health by
Protecting the Environment

THREE KEY POINTS

1. Risk assessment is designed to be protective of human health and the environment.
2. There must be a completed pathway for a risk to exist.
3. Risk assessment is one tool of many for the risk manager.

AREAS OF FOCUS

Human Health Evaluation
Ecological Evaluation



THE VALUE OF RISK ASSESSMENT

Does

- Determine potential for health effects

Does Not

- Determine if health effects have or will occur

CONCEPTUAL MODEL

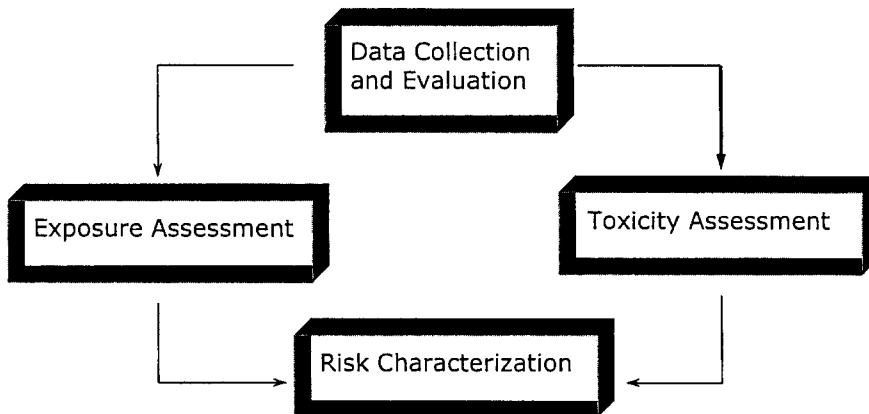


BASELINE RISK ASSESSMENT

Risk Assessment Guidance for
Superfund (RAGS)

- Required step in the CERCLA process
- Guidance is based on the National Academy of Science protocol

FOUR STEPS IN THE PROCESS



Step 1: DATA COLLECTION

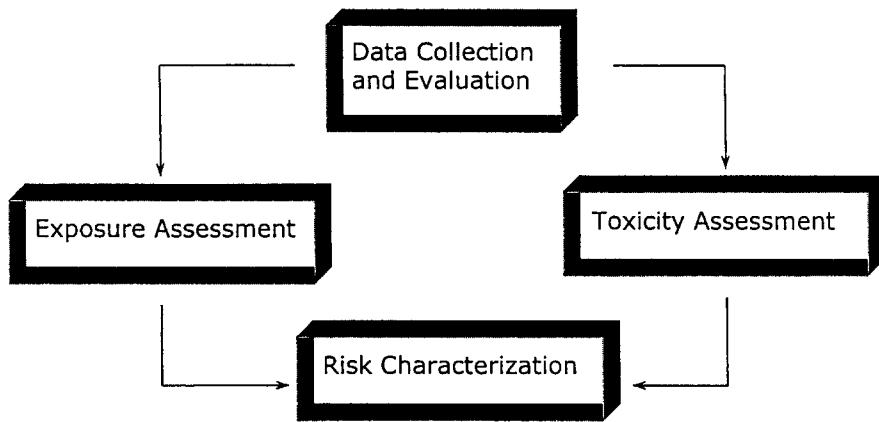
MEDIA PARAMETERS

- Soil
- Groundwater
- Surface water
- Sediment
- Air
- Biota

DATA EVALUATION

- Compare site data with risk-based comparison values
- Compare site data with background
- Identify chemicals of potential concern (COPCs)

FOUR STEPS IN THE PROCESS

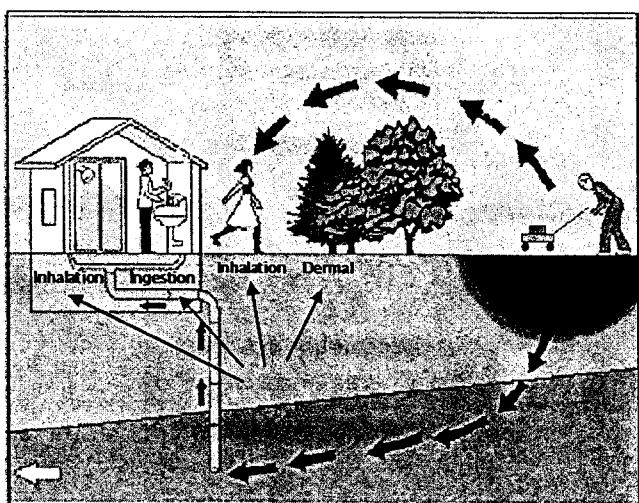


STEP 2

EXPOSURE ASSESSMENT

- Determine who is exposed and by what pathways
- Estimate magnitude of potential exposures

TYPES OF EXPOSURE



WHO COULD BE EXPOSED?

- Residents
- Workers
- Visitors or Trespassers
- Sensitive Subpopulations
 - School children
- Future Population Groups



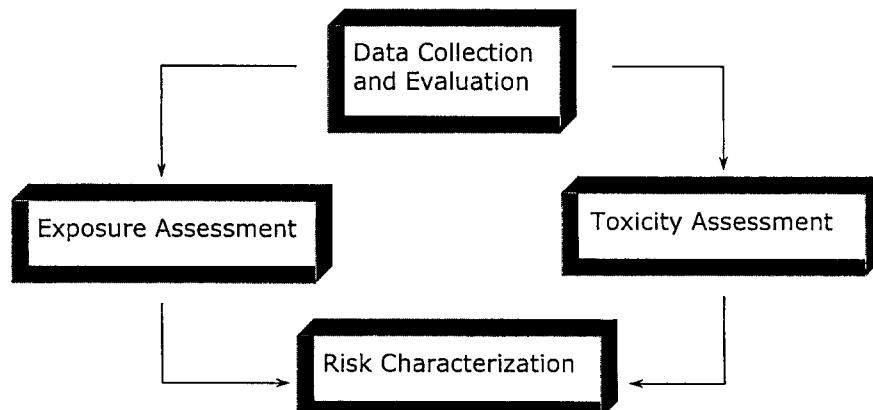
EXPOSURE PATHWAY EXAMPLE

Table 7-03-3 Exposure Pathways for Site 3 Portsmouth, Virginia										
Media	Exposure Route	Future						Current		
		Resident		Recreation		Industrial Worker	Construction Worker	Industrial Worker	Recreation	Adult Child
Adult	Child	Adult	Child	Worker	Worker					
Surface Soil	Ingestion							X ¹		
	Dermal							X ¹		
	Inhalation									
Surface and Subsurface Soil	Ingestion	X	X	X	X	X	X			
	Dermal	X	X	X	X	X	X			
	Inhalation	X	X		X	X	X			
Groundwater (Yorktown Aquifer)	Ingestion	X	X							
	Dermal	X	X							
	Inhalation	X	X							
Groundwater (Columbia Aquifer)	Ingestion						X			
	Dermal						X			
	Inhalation						X			

X Quantitative evaluation.

¹ Current and future scenario are the same.

FOUR STEPS IN THE PROCESS



STEP 3 TOXICITY ASSESSMENT

“All substances are poisons.
The right dose differentiates
between a poison and a remedy.”

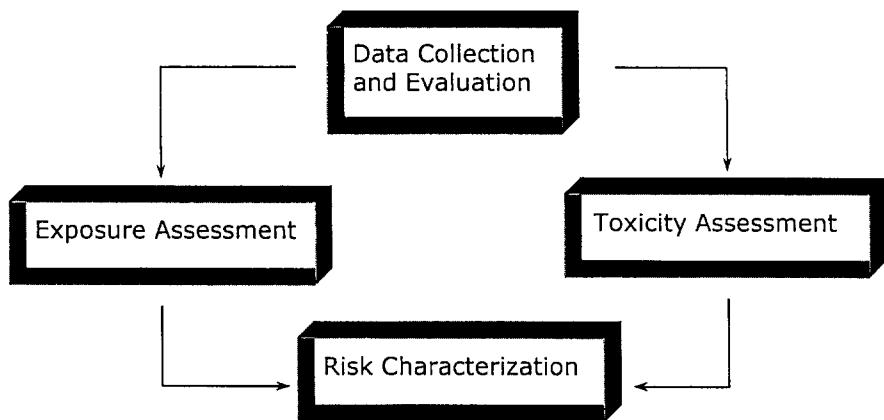
Philipus Aureolus Theophrastus Bonnastes von Hohenheim-Paracelsus (1493-1541)

TOXICITY ASSESSMENT

HEALTH OUTCOMES

- Non-Carcinogenic (Non-Cancer)
- Carcinogenic (Cancer)

FOUR STEPS IN THE PROCESS



STEP 4: RISK CHARACTERIZATION

PURPOSE

To combine the results of the Exposure Assessment and Toxicity Assessment to determine the likelihood that health effects could occur in people who came in contact with substances at a site.

RISK CHARACTERIZATION

Non - cancer Risks: are expressed as a ratio of predicted dose to an estimated allowable dose

Cancer Risks: are quantitatively expressed as a probability over a specific period of time (lifetime)

RISK CHARACTERIZATION

NON-CANCER EFFECTS are characterized by comparing exposure intakes to safe exposure levels, resulting in a Hazard Quotient.

Hazard Quotients are summed for all chemicals and pathways to produce a Hazard Index for each receptor.

The US EPA Hazard Index of concern is a Hazard Index greater than or equal to 1.

RISK CHARACTERIZATION

CANCER EFFECTS are characterized as a probability of developing cancer over a lifetime, above background. Also called an Incremental Risk of developing cancer.

Risks are summed across chemicals and pathways to arrive at an overall risk for each potential person.

INCREMENTAL RISK

The additional risk of cancer, above the background incidence, caused by exposure to substances in the environment.

LIFETIME CANCER RISKS IN THE UNITED STATES

Lifetime risk refers to the probability that an individual, over the course of a lifetime, will develop cancer.

Men: lifetime risk is 1 in 2



Women: lifetime risk is 1 in 3

Source: Cancer Facts and Figures - 2001
American Cancer Society

RISK LEVELS

CANCER EFFECTS

The US EPA acceptable risk values for excess cancer (above background) are values in the range of one in ten thousand to one in a million.

RISK CHARACTERIZATION

UNCERTAINTY ANALYSES

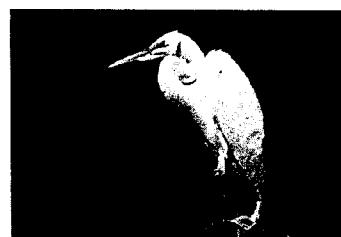
- Data collection and evaluation
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization

POINTS TO REMEMBER

- Involves the use of many health protective assumptions.
- Does not predict actual health effects that will occur, it describes potential health risk to exposed individuals within the population.
- Risk Assessment is a decision making tool used by environmental regulatory agencies.
- Used to help set cleanup levels.



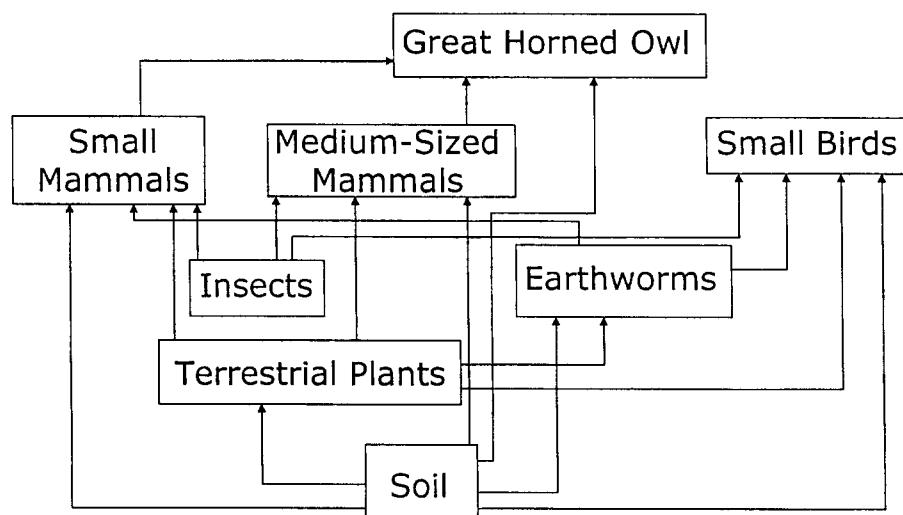
ECOLOGICAL RISK ASSESSMENT



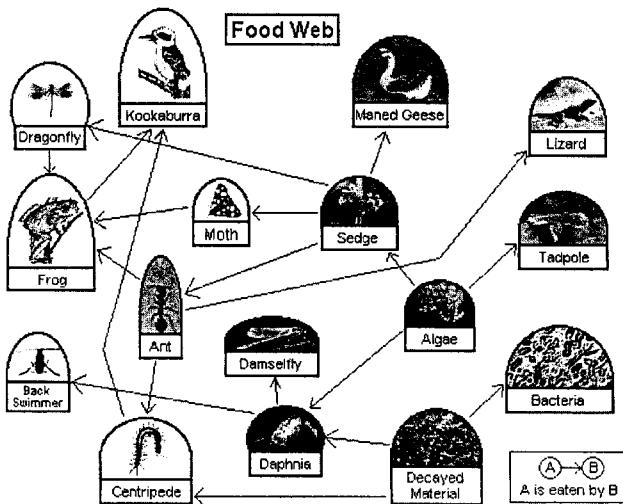
OVERVIEW

- What is an Ecological Risk Assessment?
 - A study that determines whether chemicals at a site have the potential to cause harmful effects on plants and animals at the site

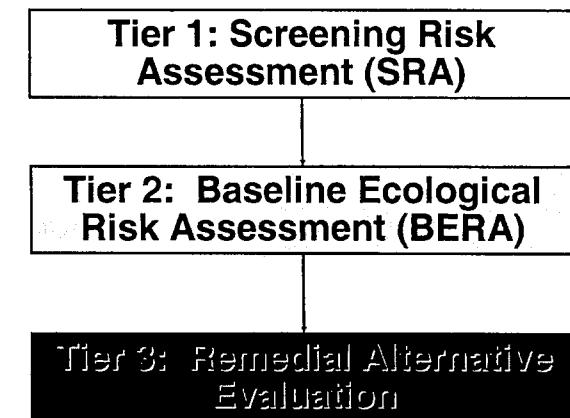
GREAT HORNED OWL FOOD WEB



ECOLOGICAL FOOD WEB



NAVY TIERED APPROACH



TIER 1: SCREENING RISK ASSESSMENT

- Step 1: Pathway Evaluation
 - Pull together existing data
 - Conduct site visit
 - Identify complete exposure pathways
 - No Further Action or Proceed to Step 2

TIER 1: SCREENING RISK ASSESSMENT

- Step 2: Risk Estimation
 - Use highest chemical concentration found
 - Assume 100% of habitat is contaminated with highest chemical concentration found
 - Assume 100% bioavailability
 - Use minimum body weights
 - Use maximum ingestion rates

OUTCOME OF TIER 1

- 1 Ecological risks are negligible
 - No further ERA & no site remediation
 - Exit the process
- 2 Unacceptable ecological risks indicated
 - More detailed risk assessment is needed
 - Enter Tier 2
- 3 Unacceptable ecological risks indicated
 - Quicker site remediation started
 - Enter Tier 3

TIER 2: BASELINE ECOLOGICAL RISK ASSESSMENT

- More realistic (site-specific) values for exposure than in the screening risk assessment
- May include
 - Toxicity testing or tissue analysis
 - Field and laboratory studies
- Identifies acceptable/unacceptable risks and ecological resources at risk
- Develops cleanup goals

RESULTS OF BASELINE ECOLOGICAL RISK ASSESSMENT

- Risk is described for specific plants/animals and quantified using a Hazard Quotient
- Includes information about “uncertainty”

TIER 2: RISK MANAGEMENT CONSIDERATIONS

Primary decision choices

- No Further Action
 - Risks posed by the site do not warrant action
- Identify and Evaluate Alternatives
 - Unacceptable risks and additional risk assessment and management decisions necessary

TIER 3: CLEAN-UP ALTERNATIVES EVALUATION

- Evaluation of clean-up alternatives
 - Based on the Nine CERCLA Evaluation Criteria
- Evaluation considers
 - Protectiveness of both ecological resources and human health
 - Long and short term success
 - Implementation impacts
 - No action alternative
 - Costs
 - Community and state acceptance

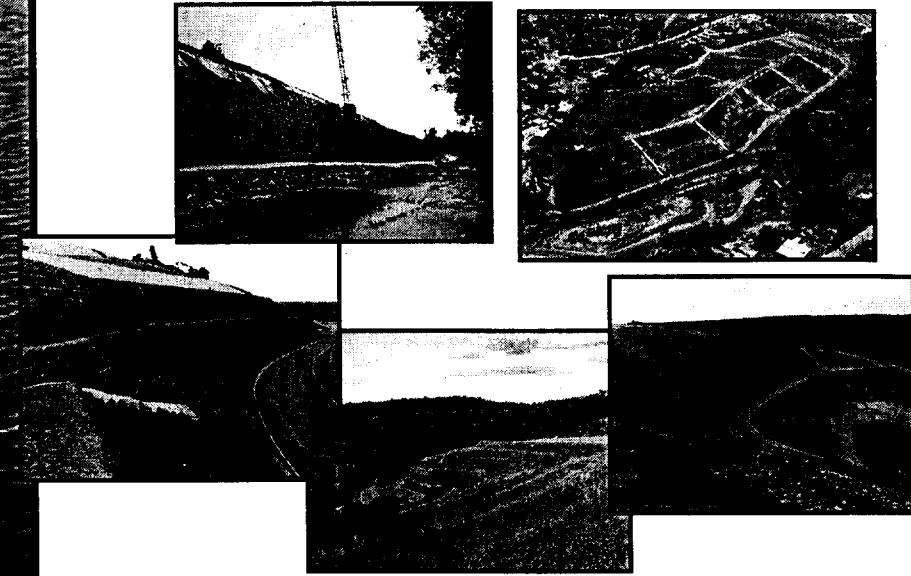
WHY EVALUATE IMPLEMENTATION IMPACTS?

- The implementation of the cure is worse than the problem.
- The impact to the natural resources could be avoided.
- A less intrusive remedy may be selected after the evaluation.

CONCLUSION

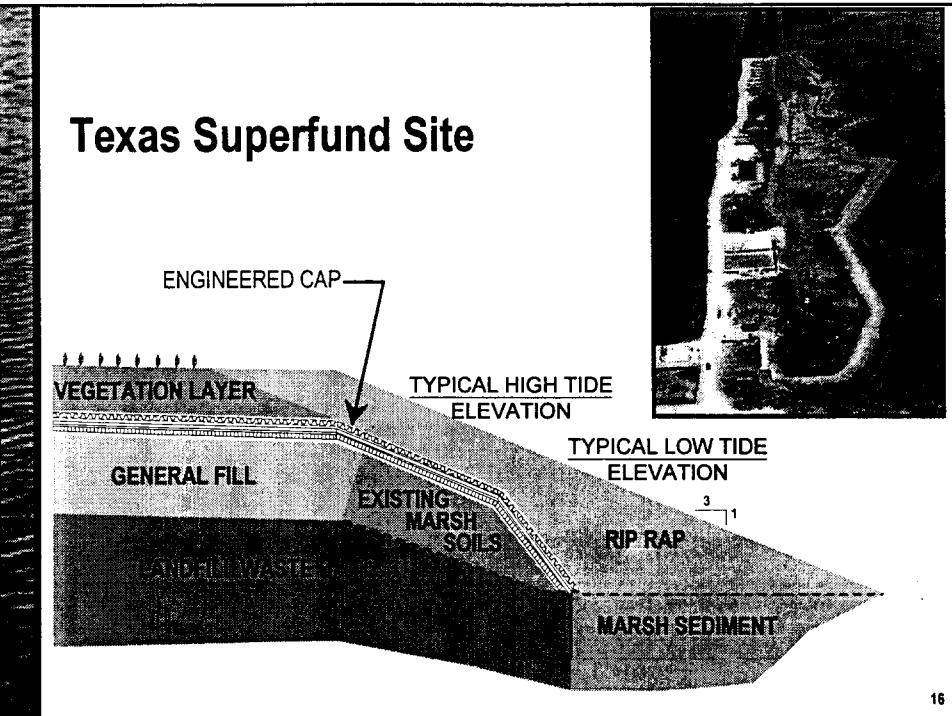
Risk assessment is designed to be very conservative in order to be protective of human health and the environment

Landfill Containment Successes



15

Texas Superfund Site



16

Summary

- Landfills are environmentally complex due to volume and variety of wastes
- Containment is the EPA Presumptive Remedy for Landfills:
 - ◆ Most common remedial approach for landfills
 - ◆ Typically the best approach based on evaluation of performance data from other sites
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Updates on the Progress of the Navy's Installation Restoration (IR) Sites in Guam

Restoration Advisory Board Meeting

June 19, 2003

Lance Young

Navy IR Sites in Guam

Completed

- Ritidian Point
- USS Proteus Fire Fighting Training Area
- NEX Garage Septic Tank

Pending Closure

- Construction Battalion (CB) Landfill
- Dry Cleaning Shop
- Tear Gas Burial Site
- RTF Barrigada, Golf Course Landfill

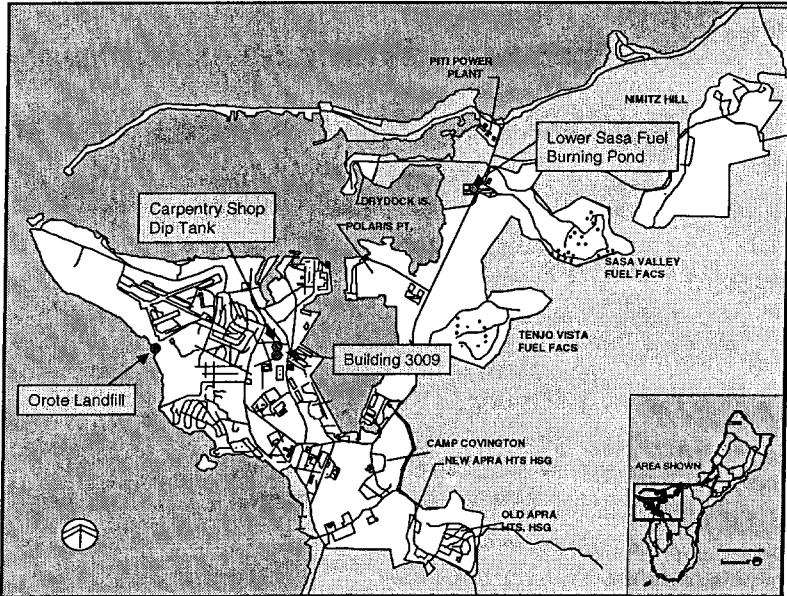
Active

- Orote Landfill
- Building 3009
- Carpentry Shop Dip Tank
- Lower Sasa Fuel Burning Pond

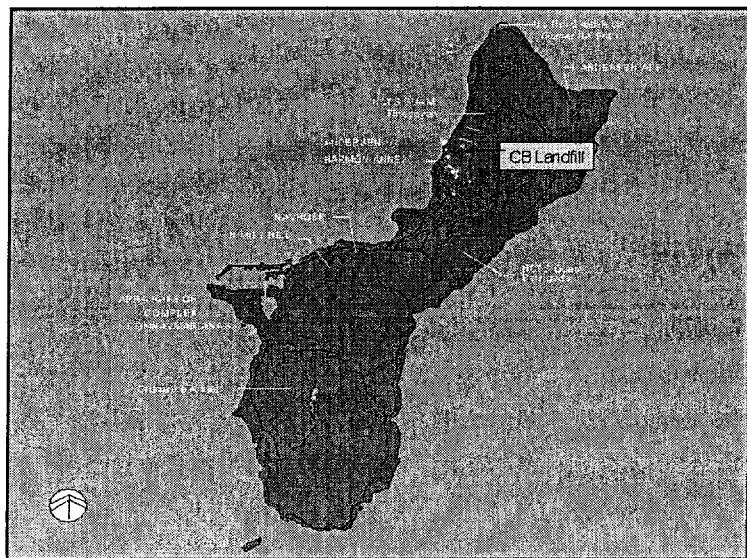
Future

- X-Ray Wharf (Former UST Site)
- Area Behind the Fenceline
- Building 27 Boiler Facility
- Barrigada Substation
- Harmon/Piti Substation
- Piti Electrical Storage Area
- Various Transformer Sites

Active IR Site Locations



Long Term Monitoring IR Site Location

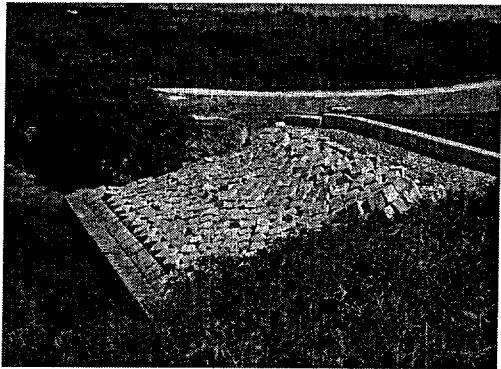


South Finegayan Construction Battalion Landfill (PWC)



- Cleanup (capping) completed in June 1998
- Continue Semi-annual Groundwater Monitoring
- Continue Cap Maintenance

Orote Landfill (COMNAVMARIANAS)



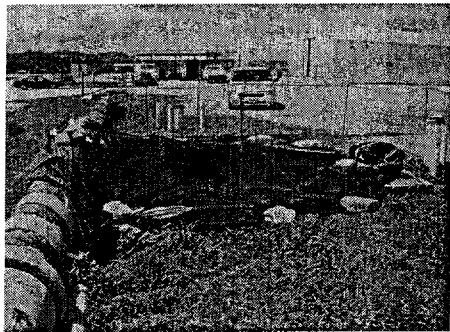
- Construction of Seawall and Landfill Cap Completed (Mar 2001)
- Draft Phase II Investigation Work Plan (Oct 2002)
- Mid and Deep water fish sampling completed May 2003

Building 3009 (PWC)



- Treatment of PCB Contaminated Soil Completed in Mar 1997
- Final Site Inspection Work Plan/Sampling and Analysis Plan will be completed at the end of 2003

Carpentry Shop Dip Tank (PWC)



Site during cleanup (Aug 2002)



Site after cleanup (Dec 2002)

Lower Sasa Fuel Burning Pond (COMNAVMARIANAS)



- Evaporation pond removed in 1999
- Approach Document for Ecological Risk Assessment (Feb 2002)
- Cleanup Strategies to be finalized in 2004



Update on the Orote Peninsula Seafood Advisory

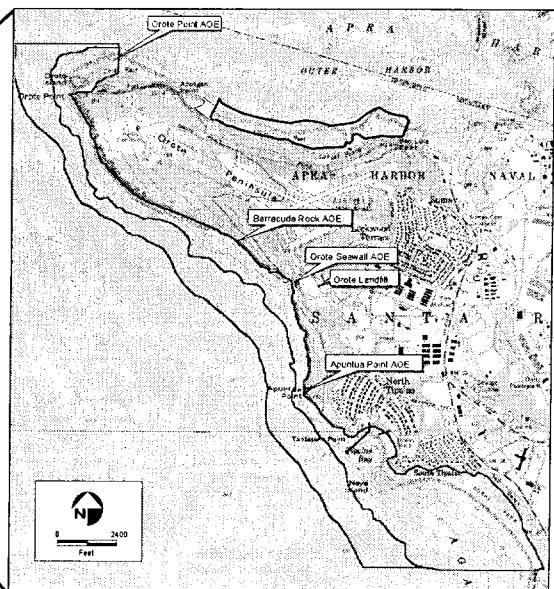
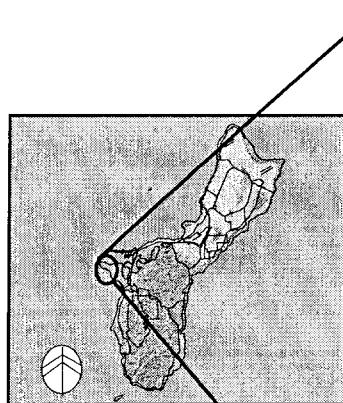
COMNAVMARIANAS, Guam

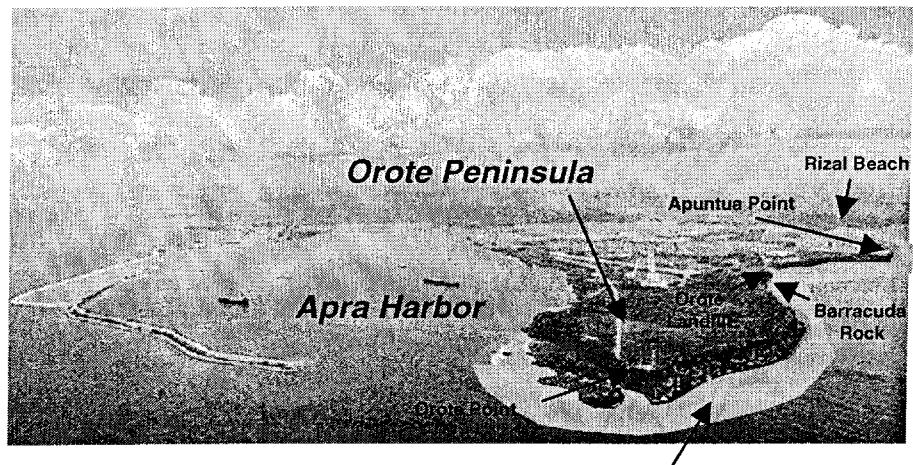
Restoration Advisory Board Meeting

June 19, 2003

Eric Wetzstein

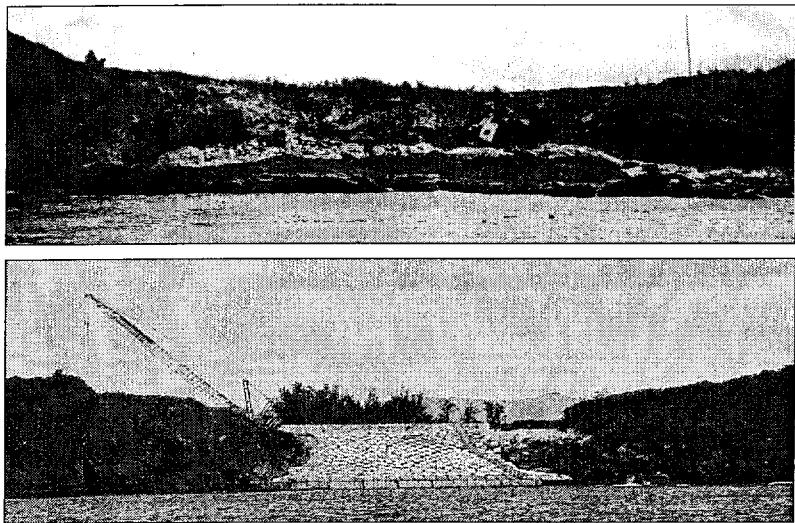
Location Map





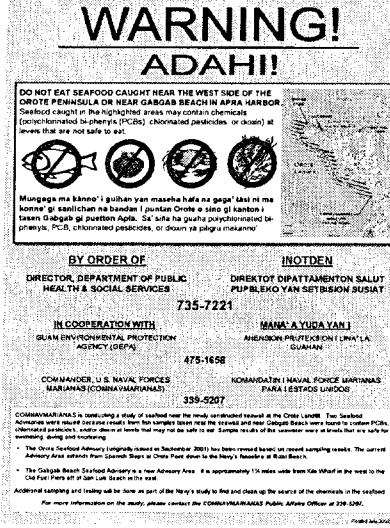
**South Orote Peninsula Marine Operable Unit
(Approximate Location)
COMNAVMARIANAS, GUAM**

Orote Beach Before and After Construction of the Seawall

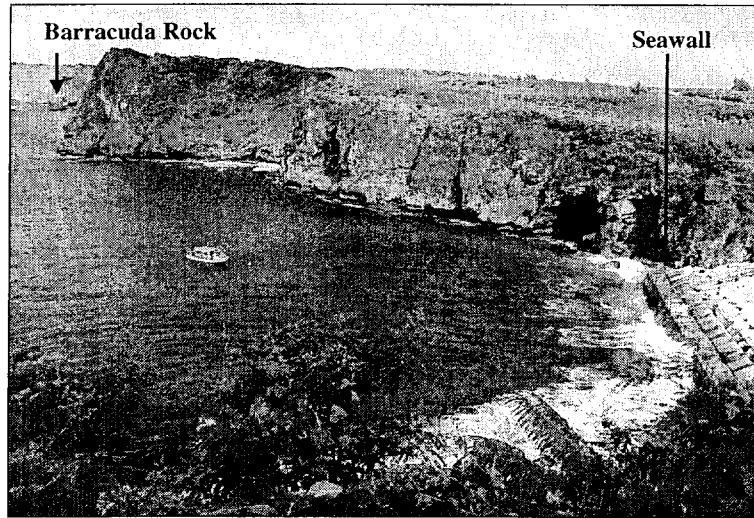


Why The Fish Advisory was Issued

- June 2001 sampling conducted to see if marine life was affected by the landfill
- PCBs and other chemicals were found in seafood at levels that may not be safe to eat
- Navy and Guam EPA recommended a seafood advisory to Guam Public Health on September 22, 2001



Nearshore Environment and Seawall

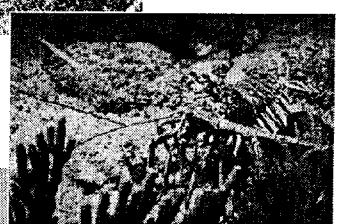
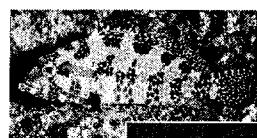


Current Study Approach

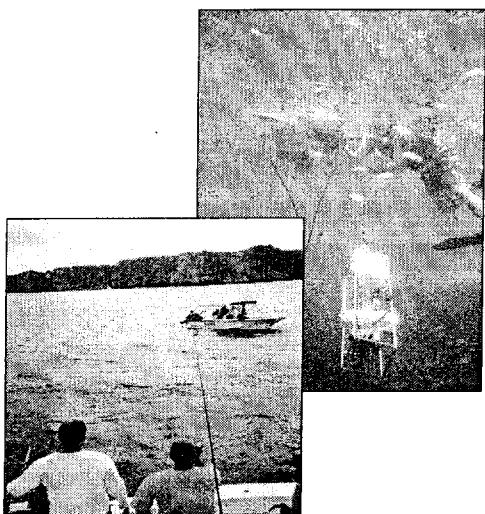
- **Phase I:** Refine the boundaries of the seafood advisory area
- **Phase II:** Identify specifically where chemicals in the advisory area are coming from and if they present a threat to human health or sea ecology
- **Phase III:** Further refine the information on the source(s) if they are found to be a threat to humans and ecology
- **Phase IV:** Cleanup/Monitoring as required

Phase I- Completed

- Sampled “territorial” reef fish within the advisory areas
- Asked local fishermen to help collect “popular” fish and seafood
- Conducted a seafood consumption survey of local residents



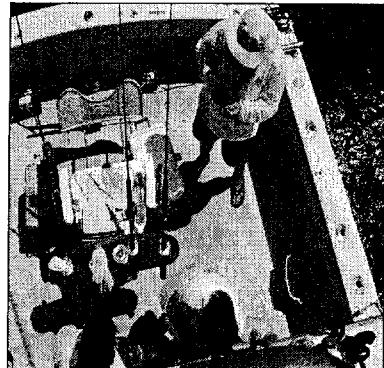
Phase II Activities to date



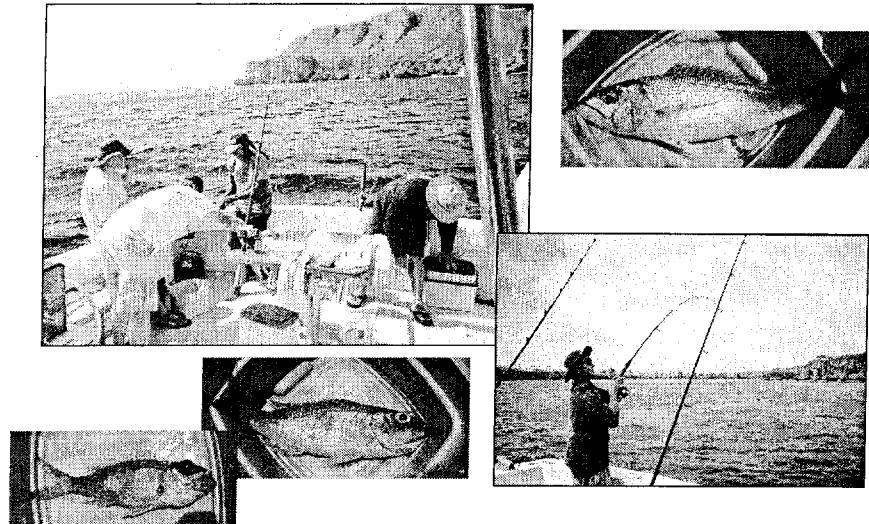
- Salinity surveys conducted in August 2002
- Identified locations for Marine Seep AOEs
- Draft Work Plans submitted October 2002
- Conducted mid to deep water fish sampling in May 2003

Mid to Deep Water Fish Sampling

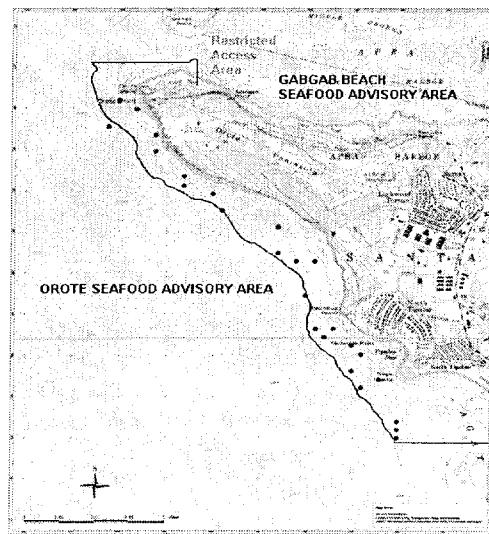
- Check if mid to deep water fish are safe to eat
- Hire local fishermen
- Test fish for suspected chemicals (PCBs, Pesticides, Dioxins)
- Recommend boundary changes based on results if warranted



Mid to Deep Water Fish Sampling

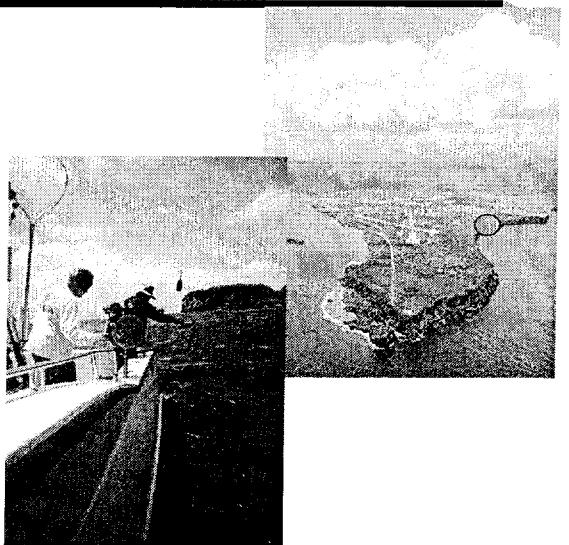


Mid to Deep Water Fish Sample Locations



Future Activities

- Monitoring well installation
- Dye trace study
- Sampling
 - Sediment
 - Seep water
 - Seafood
- Continue human health and ecological risk assessments





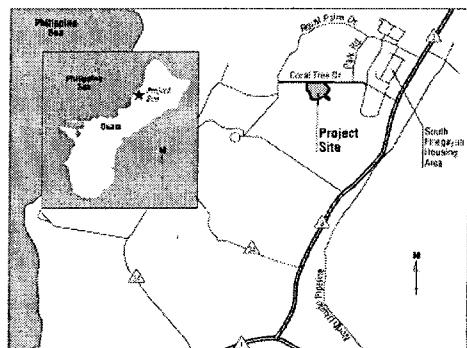
Proposed Plan
for the
Construction Battalion (CB) Landfill
South Finegayan, Guam

Restoration Advisory Board Meeting

June 19, 2003

Dean Baxley

Project Location



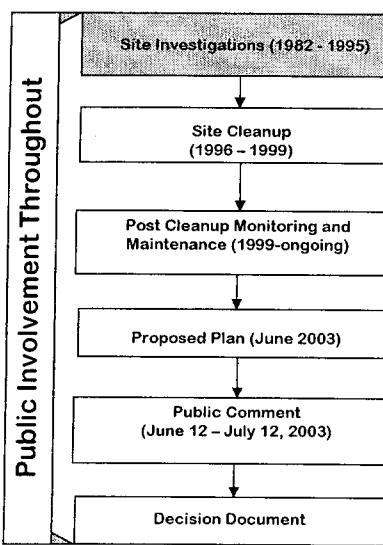
- Located on Coral Tree Drive, South Finegayan
- Within the Naval Computer and Telecommunications Area Master Station (NCTAMS)

Site History



- Landfill was Established in 1944
- Operational through 1957
- Used for Waste Disposal from the Construction Battalion Maintenance Shop
- Disposal of Scrap Metal, Construction Debris, Waste Petroleum-Based Oil, Lubricant and Solvent Wastes

Project Timeline

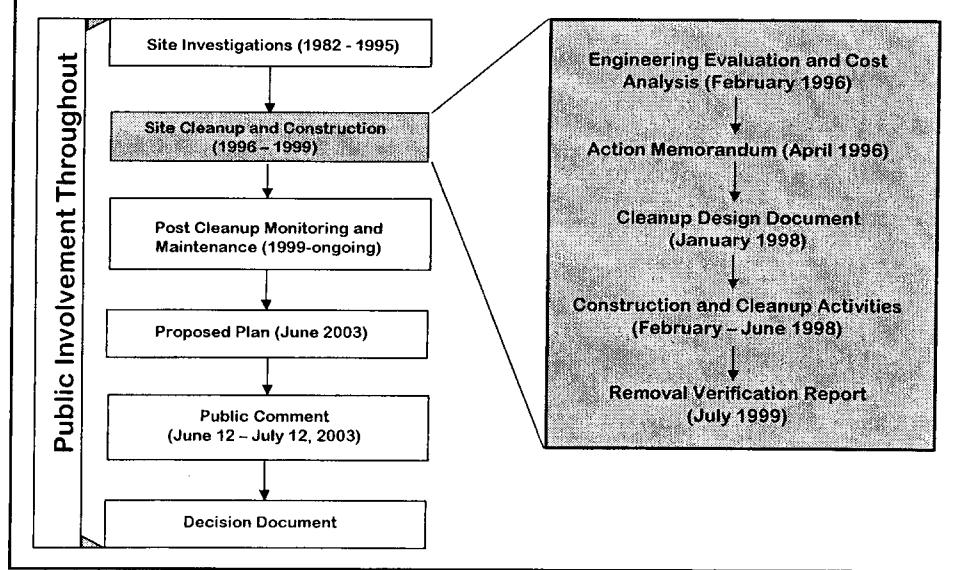


Site Investigation Findings

- Rubbish extended over an area of 2.6 Acres to a maximum depth of 35 feet
- Surface Soil Found to Contain Wastes
- Subsurface (Soil and Groundwater) found to be OK
- Methane (a Common Landfill Gas) Not Detected

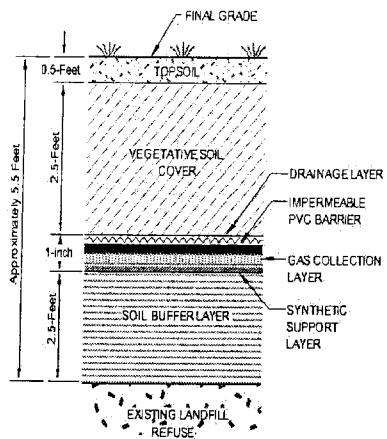


Project Timeline



Site Cleanup and Construction

- Soil Buffer Layer
- Landfill Gas Collection Layer

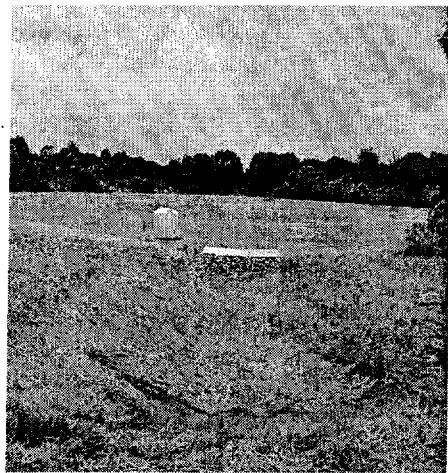


PVC Cap Installation



- PVC Cap Installation
- Vegetative Soil Cover
- Site Drainage

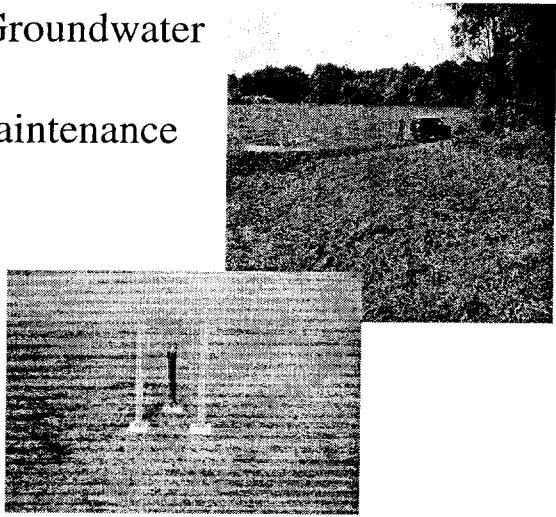
Successful Cleanup



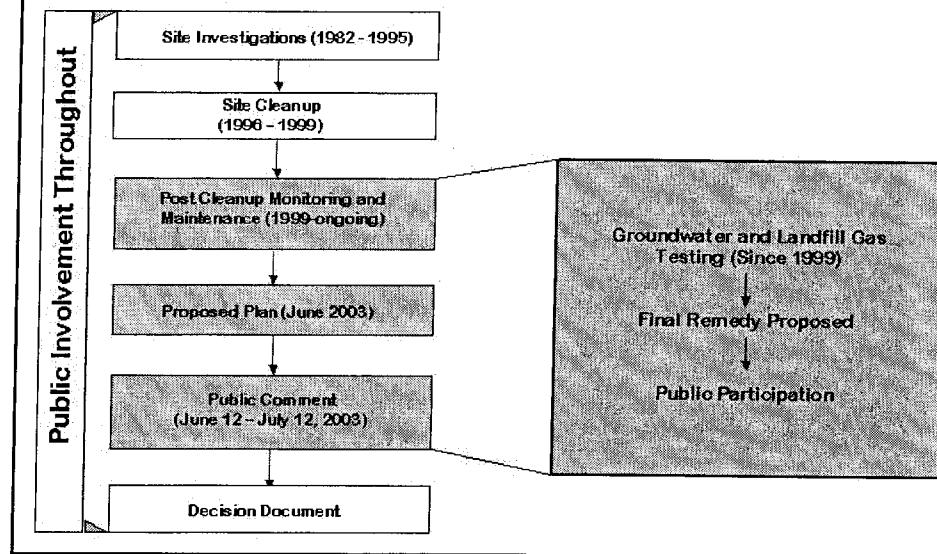
- Cleanup Verification Report Documented Results
- Wastes in Surface Soil and Rubbish are Kept Away from People and the Environment
- Storm Water is Kept from Entering the Buried Rubbish

Post-Cleanup Monitoring & Maintenance

- Landfill Gas and Groundwater Testing
- Inspections and Maintenance
 - Cap
 - Drainage system
 - Site Wells

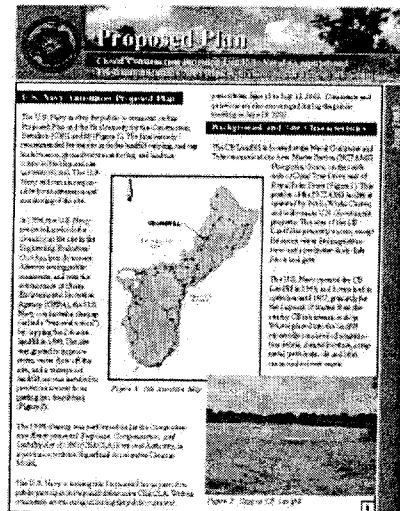


Project Timeline



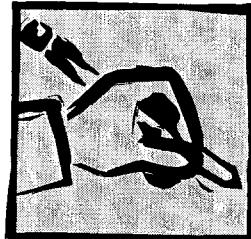
Final Remedy

- Recommended Final Remedy for the Site:
 - Waterproof Cap
 - Storm Water Control
 - Monitoring and Maintenance
 - Land Use Controls
- Public Comment Period
 - June 12 to July 12, 2003
- Information Repository
 - Nieves M. Flores Memorial Library



What's Next?

- Public Comments will be addressed in the Decision Document
- Regulatory Review
- Continue Long-Term Monitoring and Maintenance

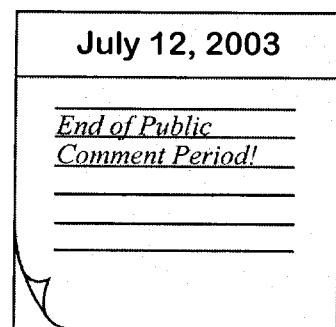


Things to Remember...

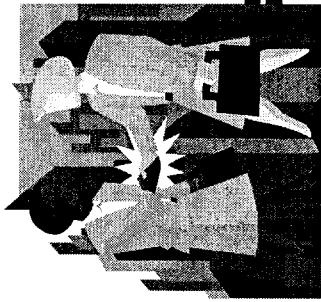
Please send your comments to:

Commander
U.S. Naval Forces, Marianas
Public Affairs Office
PSC 455 Box 152
FPO AP 96540-1165

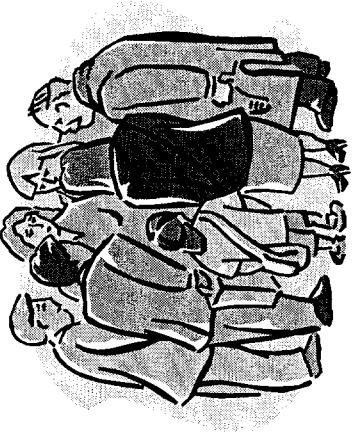
Public Affairs Officer
Telephone: (671) 339-5207
Fax: (671) 339-7034



Public Involvement



- Navy will continue to work closely with the local community and Guam regulatory agencies
- Updates will be provided as information becomes available (e.g., fact sheet, ATSDR report)
- For questions or more information, contact COMNAVMARIANAS Public Affairs Officer at (671) 339-5207 or “www.guam.navy.mil” (use link to Restoration Board)



Navy Installation Restoration (IR) Sites Quarterly Updates

Site Name	Description	Site Information	IR Document	Future Activities
Lower Sasa Fuel Burning Pond, COMNAVFMAR (formerly FISC Guam)	<p>The Lower Sasa Fuel Burning Pond was used from early 1959 to 1970 as a collection pond and burn pit for waste petroleum, oil and lubricants generated from various Navy activities. The pond received waste from an oil/water separator, which developed mechanical problems allowing oily wastewater to drain into the holding pond. Water at the bottom of the pond was drained into the adjacent wetlands via drainage channel and the remaining petroleum residue was then burned.</p>	<p>Surface water and groundwater, surface soil and subsurface soil, sediment and biological tissue samples were collected and analyzed to determine the extent of contamination. Total extractable petroleum hydrocarbons (such as gasoline, diesel, kerosene, and lubricant oil) as well as oil, grease, metals, polynuclear aromatic hydrocarbons (PAH) and pesticides were detected on this site. The contaminants were primarily detected in the sediment samples taken from the drainage channel and mouth of the channel. The results of the human health risk assessment concluded that the site does not pose a significant risk to humans. However, the ecological risk assessment identified significant risk to ecological receptors due to the PAHs and mercury found within and at the mouth of the drainage channel.</p> <p>Based on the comments from the regulators, the Engineering Evaluations/Cost Analysis (EE/CA) recommended alternative 3 instead of alternative 4.</p>	<p>Final Engineering Evaluation/Cost Analysis (EE/CA) Report (Dec 1997)</p> <p>Final Action Memorandum (Aug 1998)</p> <p>Draft Removal Action Design (Aug 1998)</p> <p>Final Sampling and Analysis Plan /Health and Safety Plan (Jan 2000)</p> <p>Final Revised Screening Ecological Risk Assessment (Dec 2001)</p> <p>Approach for the Ecological Risk Assessment (Feb 2002)</p> <p>An Action Memorandum will be signed to document the selected alternative.</p> <p>Draft Baseline Ecological Risk Assessment (Fall 2003)</p> <p>Finalize the Removal Action Design (Winter 2003)</p> <p>Finalize Cleanup Strategies in 2004</p> <p>Sighting of common moorhen was reported in the Lower Sasa wetland area in 1999. This change in site condition requires additional data to properly assess the ecological risk to the common moorhen. Additional sampling was conducted in January 2000.</p> <p>The results of the draft revised Screening Ecological Risk Assessment identified that concentrations of the chemicals of potential concern are above the screening standard indicating that a more in-depth ecological risk assessment (baseline ecological risk assessment) is necessary.</p>	

Site Name	Description	Site Information	IR Document	Future Activities
Building 3009, PWC Guam	<p>Building 3009 was used as an electrical transformer repair shop from 1950 to 1977. Electrical transformers were overhauled there, which involved the cleaning and repairing of parts and the recycling of transformer oils. Four storage tanks were located besides the building with two filtering systems; one for mineral oil and the other for PCB oil. In 1977, the PCB filter system and piping were removed due to leakage from the PCB storage tank.</p> <p>Soil samples taken around the building and along a portion of the nearby drainage ditch identified significant polychlorinated biphenyls (PCB) contamination. A Removal Action was performed using the Base Catalyzed Decomposition Process (BCDP) due to the high levels of PCB detected at the site. Treatment of PCB contaminated soil was completed in 1997. A Site Inspection (SI) will be conducted to assess the nature and extent of contamination remaining on this site.</p> <p>Additional soil samples were taken in Nov 1998 to determine the extent of 2 hot spots.</p> <p>Draft SI Work Plan/Sampling and Analysis Plan completed in October 2000 which is available for review and comment.</p>	<p>Final Remediation Verification Report (Dec 1998).</p> <p>Draft SI Work Plan/Sampling and Analysis Plan (Oct 2000)</p>	<p>Final SI Work Plan/Sampling and Analysis Plan (Summer 2003)</p> <p>A Site Inspection (SI) is scheduled for FY 2004</p>	

Site Name	Description	Site Information	IR Document	Future Activities
Carpentry Shop Dip Tank, PWC Guam	<p>The Carpentry Shop Dip Tank Site was used continuously from 1953 to 1972 and sporadically until 1979 to preserve wood. Pentachlorophenol (PCP), other preservatives including metal salt solutions (containing arsenic, chromium, copper, and zinc), aromatic-based oil, and methylene chloride (possibly as a carrier for PCP) were the wood preservatives used. The dip tank consisted of a below-grade vault made of steel reinforced concrete.</p> <p>Wood was soaked in the tank for approximately 24 hours and allowed to drip dry over the concrete vault or an adjacent concrete pad, which both discharged either to a surface water drainage system or to the dip tank itself. The dip tank vault was left in place and backfilled level with the ground surface, the drying rack and above ground storage tank were removed in 1979.</p> <p>Groundwater, sediment, surface and subsurface soil samples were collected and analyzed to determine the extent of contamination. Volatile organic compounds (VOCs), pentachlorophenol (PCP), polynuclear aromatic hydrocarbons (PAHs), dioxins, fuel hydrocarbons and elevated concentrations of arsenic, chromium, copper, and zinc were detected on this site. The contaminants were primarily detected in surface sediment, surface and subsurface soil and groundwater samples. The preliminary results of the human health risk and ecological risk assessments indicate that the site does not pose a significant risk to humans or to the environment.</p> <p>A cleanup was conducted in Feb 1998 to remove the source of contamination – dip tank, drain lines and sump. Based on the comments on the Remedial Investigation (RI) Report from the regulators, additional sampling was performed to verify the conclusions of the draft RI. Soil samples were collected from around the former dip tank and two rounds of groundwater sampling were conducted, one during the wet season (July 1999) and one during the dry season (February 2000).</p> <p>Results from additional sampling were incorporated into the draft final RI in February 2001 which recommended a limited removal of contaminated soil around the former dip tank to reduce the human health risk to an acceptable level. The draft final RI is available for review and comment.</p> <p>Limited removal action was conducted in August 2002, approximately 13 cubic yards of dioxin-contaminated soil were excavated. Confirmation soil samples were taken and analyzed. Analytical results for all samples were all below action levels (that means all contaminated soil have been removed). Contaminated soil, debris and wastewater were packed and transported to an off island disposal facility.</p>	<p>Draft Remedial Investigation (RI) Report (Jul 1995)</p> <p>Final Field Sampling Plan and Quality Assurance Project Plan Addenda a (May 1999)</p> <p>Incorporate results from the additional sampling into the draft final RI report (Feb 2001).</p> <p>Final Work Plan for Removal Action (Jan 2002)</p> <p>Final Removal Verification Report (RVR) for limited removal action (Jan 2003)</p>	<p>Final RI report (Fall 2003)</p> <p>Proposed Plan (Spring 2004)</p>	

Site Name	Description	Site Information	IR Document	Future Activities
South Finegayan CB Landfill, PW/C Guam	<p>The Construction Battalion (CB) Landfill site was used from 1944 to 1959 as a disposal area for wastes from the CB maintenance shop operated in the area.</p> <p>Scrap metal, waste oil, and solvents, lead-based paints, tires and equipment parts were disposed at the site. The wastes observed in the landfill include concrete and metallic construction debris, glass bottles, tires, vehicle parts, pipes, domestic wastes, and burned liquid and solid wastes.</p> <p>Additionally, the pesticide DDT was heavily applied to the site.</p>	<p>Groundwater, surface and subsurface soil samples were collected and analyzed to determine the extent of contamination. DDT, polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), fuel hydrocarbons, volatile organic compounds (VOCs), elevated concentrations of antimony, arsenic, lead, mercury, and zinc were detected in the soil samples. Ground water samples contained elevated concentrations of some metals and low levels of VOCs and semi-volatile organic compounds which are common laboratory contaminants. The results of the human health risk and ecological risk assessments determined that a significant risk exists to humans and the environment via contact with surface soil at the site.</p>	<p>Final Landfill Cap Design (Jan 1998)</p> <p>Final Site Work Plan for Landfill Cap (Jan 1998)</p> <p>Final General Site Work Plan for Groundwater Monitoring Program (June 2003)</p> <p>Decision Document (Sep 2003)</p>	<p>Maintenance and groundwater monitoring will continue to ensure cap integrity.</p> <p>Abandonment of on-site monitoring wells (June 2003)</p> <p>Proposed Plan (June 2003)</p>

Site Name	Description	Site Information	IR Document	Future Activities
Dry Cleaning Shop (DCS) Site, COMNAVMAR (formerly NAVACTS)	<p>The DCS Site was in operation from 1952 to 1975 and processed the laundry and dry cleaning for all Naval facilities. Eight underground storage tanks (USTs) were located onsite which contained stoddard solvents (a petroleum based dry cleaning solvent), fuel oils (for use in the cleaner boilers), and brine storage (possibly for water softening treatment). The investigation was initiated because solvents were believed to have leaked from the USTs or dumped on the ground as sludge. The solvents may then move to the groundwater.</p> <p>Soil, wetland sediment, and groundwater samples were collected and analyzed to determine the extent of contamination. Tissue samples from organisms near the site were also collected.</p> <p>Fuel hydrocarbons, polynuclear aromatic hydrocarbons (PAHs), solvent related compounds, and some metals were found to be the contaminants detected onsite. Compounds were primarily detected within the subsurface soil around the solvent USTs and the piping associated with the fuel USTs. A 6"-12" thick layer of solvent was detected above the brackish groundwater in the vadose zone (unsaturated soil layer above the groundwater).</p> <p>The result of the baseline human health risk assessment and preliminary ecological risk assessment showed that current contaminant levels at the site do not pose a significant risk to humans or the environment.</p> <p>Additional groundwater sampling was conducted in late August 2000 (wet season) and in Feb 2001 (dry season).</p>	<p>Final Field Sampling Plan Addendum and Quality Assurance Project Plan Addendum (Sep 2000)</p> <p>Final Remedial Investigation (RI) Report Addendum - Additional Groundwater Sampling Results (Jul 2002)</p> <p>Proposed Plan (Aug 2002)</p> <p>Decision Document (Dec 2002)</p>	<p>Additional comments received from GEPA on the Decision Document in May 2003 requesting for additional sampling.</p> <p>Additional sampling planned for 2004</p>	<p>Decision Document to be signed in Dec 2004</p>

Site Name	Description	Site Information	IR Document	Future Activities
Orote Landfill, COMNAVFMAR (formerly NAVACTS)	<p>The Orote Landfill occupies approximately 9.4 acres of land. It was used for the disposal of residential, industrial, and construction wastes from approximately 1944 to 1969. The face of the cliff that surrounds the landfill was reportedly the most active disposal area. Flammable material was burned, and the ashes were buried on the cliff above the nearby cove. Nonflammable materials were either buried behind the cliff or bulldozed over the cliff onto the beach. The beach previously contained a large amount of rusted metal and other debris.</p> <p>Soil within the site boundaries has elevated concentrations of polychlorinated biphenyls (PCBs), pesticides, total fuel hydrocarbons (TFHs), polynuclear aromatic hydrocarbons (PAHs), volatile organic carbons (VOCs), and metals. Low levels of dioxins were detected in soil samples collected within the landfill, but concentrations do not appear to be significantly elevated above samples taken outside the landfill.</p> <p>The Human Health Risk Assessment (HHRA) concluded that site-related contamination does not appear to pose a significant carcinogenic risk to human health. However, site related contamination does present a non-carcinogenic hazard to human health. The modes of exposure are primarily through ingestion of soil, direct contact with soil and ingestion of organisms from the site. In addition, Screening Ecological Risk Assessment (SERA) was conducted under the Removal Site Evaluation (RSE). The RSE concluded that although the groundwater may be slightly impacted by the landfill, the risk to sea life from groundwater at the site is not significant based on a detailed risk assessment.</p>	<p>Surface and subsurface soil samples, groundwater and seawater samples, as well as marine tissue samples were collected to determine the nature and extent of contamination at the Orote Landfill.</p>	<p>Final Engineering Evaluation/Cost Analysis (EE/CA) (Feb 1999)</p>	<p>Final Work Plan for MW Installation (Aug 2003)</p>

Site Name	Description	Site Information	IR Document	Future Activities
		<p>sampling, a seafood consumption advisory (Agat Bay seafood advisory), which extended from Ororte Point to Nimitz Beach, was issued in Sep 2001.</p> <p>Phase I investigation Fish samples were collected in November and December 2001 to address human health concerns and refine the seafood advisory boundaries. A reduced seafood advisory (Orote seafood advisory), which extended from Ororte Point to Rizal Beach, was issued in May 2002 based on the November and December 2001 fish tissue sample results. A separate fish advisory (Gabgab Beach seafood advisory), which extended from east of ammunition wharf to Old Fuel Pier was issued in May 2002.</p> <p>Phase II investigation Salinity surveys conducted in August 2002 to identify locations for marine seeps in Areas of Evaluations (AOEs) within the Marine Operable Unit (OU).</p> <p>Mid and deep water fish samples were collected in May 2003. Fish will be tested for PCBs, dioxins, and pesticides. Expect results in Oct 2003.</p>	<p>Draft Baseline Ecological Risk Assessment (BERA) Work Plan / Sampling and Analysis Plan (WP/SAP) (Mar 2001)</p> <p>Final Remediation Verification Report for the Seawall (July 2001)</p> <p>Final Remediation Verification Report for the Landfill Cap (Aug 2001)</p> <p>Final Inspection and Maintenance Plan for the Shore Protection (Apr 2002)</p> <p>Field Sampling Plan for Fish and Seafood Tissue Collections (Phase D) (Jun 2002)</p> <p>Final Inspection and Maintenance Plan for the Containment System (Sept 2002)</p>	<p>Final Phase II Planning Documents (Dec 2003)</p>

Site Name	Description	Site Information	IR Document	Future Activities				
			Draft Screening Ecological Risk Assessment (USEPA and USN Step 1 and 2) and Baseline Ecological Risk Assessment (USN Step 3A) (Jul 2002)	Draft Phase II Planning Documents (Oct 2002)	Orote Landfill Shore Protection Visual Photo Inspection Report (Nov 2002)	Draft Work Plan for Monitoring Wells (MW) Installation (April 2003)	Quarterly Site Inspection Report – First Quarter (Mar 2003)	Quarterly Site Inspection Report – Second Quarter (June 2003)

Site Name	Description	Site Information	IR Document	Future Activities
NEX Garage Septic Tank Site, COMNAVMAR (formerly NAVACTS)	<p>The septic tank is a subsurface concrete structure. The septic tank was connected to a waste oil underground storage tank (UST) via an underground pipeline. The waste oil UST was removed in 1987. Another pipeline connected to this septic tank ran out to Agat Bay. From 1955 to 1975, waste oils, automotive fluids, and cleaning solvents that were generated at the NEX Garage Septic Tank Site were disposed of in the waste oil UST.</p> <p>Low levels of total fuel hydrocarbons (TFHs) and polychlorinated biphenyls (PCBs) were found in the former waste oil tank area. Low levels of TFHs, PAHs, and some pesticides were found within the pipeline through a manhole access, but no significant levels were found outside the sewer pipeline. Petroleum sludge was found within the concrete septic tank, no significant releases were found to have occurred outside the septic tank.</p>	<p>Soil, groundwater, pipeline sediment, septic tank, marine sediment and biological tissues were collected and analyzed to determine the extent of contamination. Soil and sediment bioassay were also conducted.</p>	<p>Final Engineering Evaluation/Cost Analysis (EE/CA) (Feb 1998)</p> <p>Final Action Memorandum (May 2000)</p> <p>Final Field Sampling Plan for Post-Removal Confirmation Sampling (Aug 2000)</p> <p>Final Quality Assurance Project Plan (Dec 2000)</p> <p>Final Work Plan for the Removal Action (Dec 2000)</p>	<p>Monitoring wells will be abandoned (2004)</p> <p>Decision Document was submitted to GEPA on 3 Dec 2002 and signed by GEPA on 3 Feb 2003. No further cleanup action is required at this site. Monitoring wells will be abandoned in 2004.</p>

Update on the Orote Seafood Advisory Phase 2 Study



June 2003

This Fact Sheet describes the investigation of potential human health risks from the consumption of seafood caught in the Orote Seafood Advisory Area under the Installation Restoration (IR) Program. This is No. 1 in a series of informational flyers that will be issued periodically throughout the Orote Seafood Advisory Ph 2 Study.

INTRODUCTION

This fact sheet provides updated information regarding the investigation of potential human health risk from the consumption of seafood caught from within the Orote Seafood Advisory Area. Phase I seafood sampling, which included sampling of nearshore territorial fish, and limited mid and deep water fish sampling, as well as a seafood consumption survey and analysis, was conducted in June 2001 and November/December 2001. Based on the results of the Phase I efforts, the waters between Nimitz Beach and Rizal Beach have been removed from the initial Agat Bay Seafood Advisory. The Agat Bay Seafood Advisory was reduced and renamed the Orote Seafood Advisory in May 2002. The current Orote Seafood Advisory includes the area from Orote Point to the southern portion of Rizal Beach (COMNAVMARIANAS fenceline). As a precaution, Guam Public Health has advised people not to eat seafood (e.g. octopus, seaweed, crabs, lobsters, fish, etc.) caught from within the Advisory area. A separate seafood advisory was issued for Gabgbab Beach in May 2002 (see Fig. 1) and it will be addressed in a later study.

To address the potential health effects from consuming seafood from the mid and deep water regions (120-600 foot depth contour), a fish sampling effort was conducted in May 2003. This effort included collecting fish samples from within the Orote Seafood Advisory Area at the locations depicted in Fig. 1. Selected fish samples will be analyzed for polychlorinated biphenyls (PCBs), dioxins/furans and chlorinated pesticides. A human health risk assessment on the results of the mid and deep water fish sampling will be completed in October 2003.

MID AND DEEP WATER FISH SAMPLING

The mid and deep water fish sampling effort was conducted in May 2003 with oversight from Guam EPA, EPA Region 9, Department of Aquatic and Wildlife Resources (DAWR), and assistance from local fishermen (see Fig. 3). Fish were collected during day and night sampling periods.

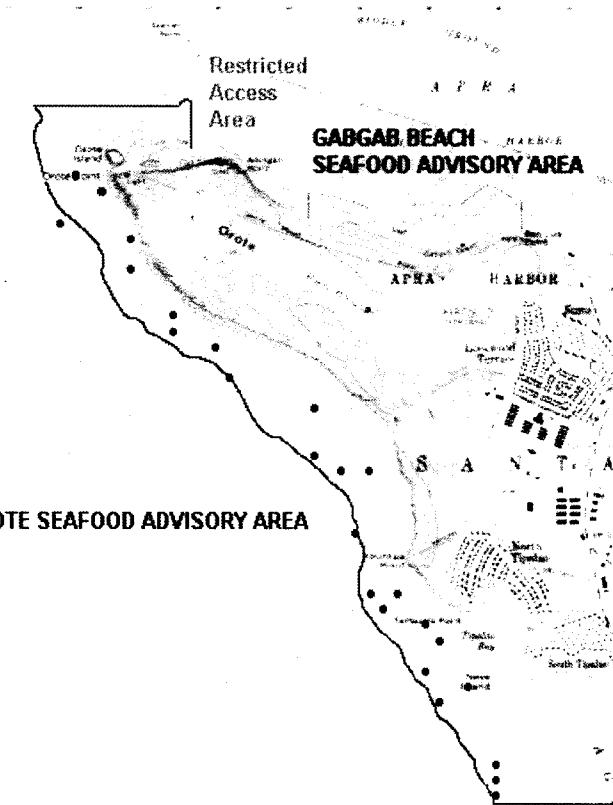


Fig. 1. Orote Seafood Advisory Area and mid and deep water fish sampling locations



Fig. 2. Fish collected for analysis – Lehi or silvermouth

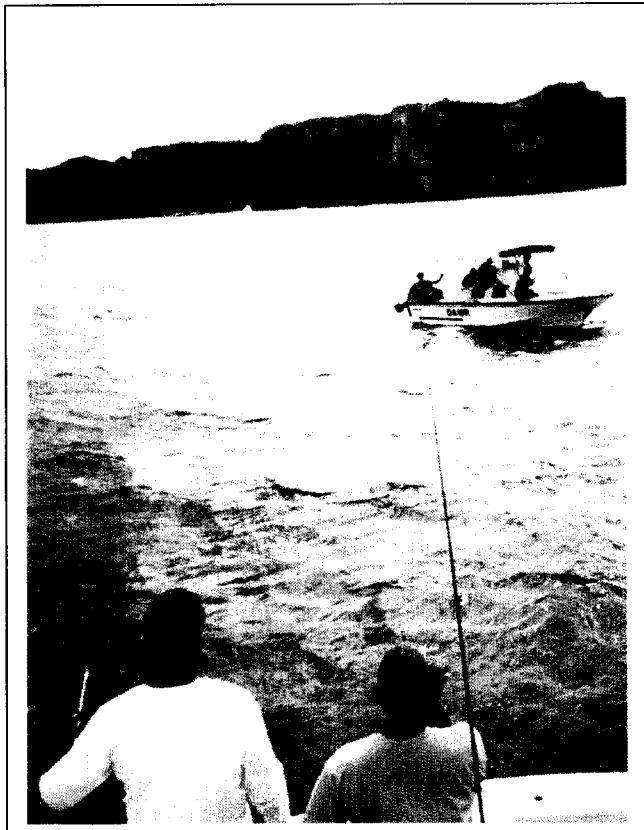


Fig. 3. Navy and GEPA Fishermen

The selection of the commonly caught and consumed fishes for analyses was based on specific recommendations provided by local experts such as the DAWR, Guam EPA and USEPA. The criteria used in the selection for testing included prevalence, location and variety of available fish, local consumption data from the Phase I survey, and published technical information for particular fish types.

A total of 16 different mid and deep water fish species were caught for analysis (see Fig. 2 and 4). They include:

- “Opakapaka,” a bunina (*Pristipomoides flavipinnis*)
- “Gadao,” blacktipped grouper (*Epinephelus fasciatus*)
- “Gindai,” oblique banded snapper (*Pristipomoides zonatus*)
- Yellowtail “Kalikali,” gold flagged jobfish (*Pristipomoides auricilla*.)
- “Lililok,” long faced emperor (*Lethrinus olivaceus*)
- “Buninas,” blue striped snapper (*Pristipomoides argyrogrammicus*)
- “Funai,” blue lined snapper (*Lutjanus kasmira*)
- “Satmoneti,” cinnabus goatfish (*Parupeneus heptacanthus*)
- “Ehu,” ehu (*Etelis carbunculus*)

- “Gadao,” flagtail grouper (*Cephalopholis urodetata*)
- “Onaga,” onaga (*Etelis coruscans*)
- “Mafute,” large eyed bream (*Gymnocranius microdon*)
- “Gadao,” lyretail grouper (*Variola louti*)
- “Gadao,” orange grouper (*Cephalopholis analis*)
- “Saksak,” shoulderbar soldierfish (*Myripristis kuhnei*)
- “Lehi,” silvermouth (*Aphareus rutilans*)

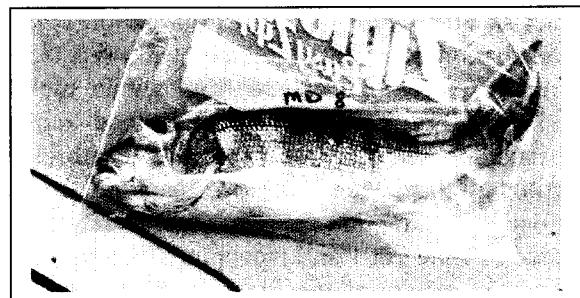


Fig. 4. Fish collected for analysis - Opakapaka

NAVY PUBLIC OUTREACH PROGRAM

The Navy has diligently worked to provide the public and regulatory agencies with information regarding new developments pertaining to the Orote Seafood Advisory. The outreach program has included advertisements/notices in local papers and radio, warning/advisory signs at fishing locations within the advisory areas, such as local sport fishing areas and diving businesses, and at public meetings in local communities and Restoration Advisory Board meetings. Through this phased approach, the Navy will continue with outreach efforts during Phase II of the investigation to ensure proper public awareness implemented for the Orote Landfill Site.

FUTURE ACTIVITIES

The Navy, in collaboration with Guam EPA and other regulatory agencies, are currently conducting the Phase II investigation of the Orote Marine Operable Unit. Results from the mid and deep water fish sampling and human health risk assessment will be available in October 2003.

FOR MORE INFORMATION

Contact the Commander, U.S. Naval Forces Marianas (COMNAVMARIANAS) at (671) 339-5207 or Guam EPA at (671) 475-1658. Past studies and reports on Orote Landfill are currently available at the Information Repository at Nieves M. Flores Library in Hagatna.

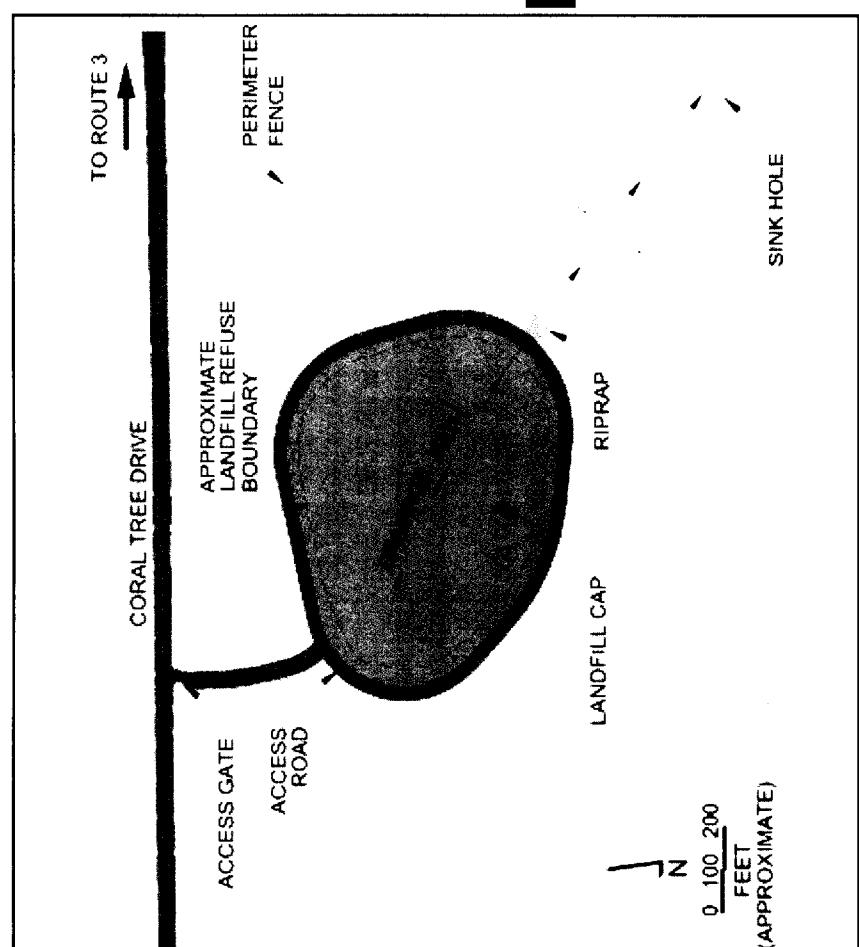


Figure 3: Site Map

pounds (VOCs), metals, polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs) and pesticides. No VOCs, PCBs, pesticides or PAHs were detected in groundwater samples collected from the wells around the landfill, however other petroleum hydrocarbons (lubricant oil) and metals were detected at low levels. Landfill gases detected at the site were limited to a few VOCs. No methane (a common landfill gas) was ever detected.

Site Risks Identified

Risk assessments were conducted to determine if the chemicals found at the site were safe or not for humans, plants, and animals. Based upon these assessments, it was agreed that chemicals present in the surface soil made it unsafe, but those found in the subsurface soil, buried refuse, and groundwater did not pose a threat to humans or the environment.

Based on the environmental investigations and risk assessment work, the U.S. Navy and GEPA agreed that cleanup was necessary at the CB Landfill to protect local residents and the environment.

The CB Landfill occupies a depression underlain by porous limestone rock that is characteristic of the karst terrain of northern Guam. Because the limestone is porous, storm water percolates quickly into the ground. Due to its relatively high elevation, groundwater beneath the CB Landfill occurs at over 300 feet below the ground surface.

Past Site Investigations

The U.S. Navy has conducted three environmental investigations at the CB Landfill to assess the site for contamination:

1. Initial Assessment Study (IAS) in 1982,
2. Site Investigation (SI) in 1990, and
3. Remedial Investigation (RI) in 1995.

The investigations included installing groundwater monitoring wells, performing soil and groundwater sampling, and conducting wetlands, soil gas, and archaeological surveys.

Investigators found rubbish to extend over an area of 2.6 acres to a maximum depth of 35 feet. Soil (surface and subsurface) at CB Landfill was found to contain low concentrations of petroleum hydrocarbons, volatile organic com-



Figure 8: CB Landfill after the cleanup

A cleanup report (referred to as a Remediation Verification Report) was prepared in 1999 following the completion of the Removal Action (Figure 8). The cleanup report documented that the construction activities performed at the CB Landfill were completed in accordance with the design plans and specifications prepared for the cleanup.

Post-cleanups monitoring and maintenance at the CB Landfill was started in May 1999. Monitoring included sampling groundwater from the monitoring wells, nearby drinking water supply wells, and several coastal springs, and monitoring for landfill gas following the *General Site Work Plan*. Site maintenance includes inspecting the condition of the final cap system and drainage ditches, and conducting maintenance and repair to assure they are in good working condition.

Data collected from the post-cleanups monitoring indicate that the groundwater quality either has improved or remains stable since the completion of the cleanup. No methane gas has been detected in any of the landfill gas vents. In February 2003, GEPA concurred with the closure of the seven onsite groundwater monitoring wells.

Recommended Final Remedy

Based on the groundwater and landfill gas data collected during the last three years of post-cleanups monitoring, the U.S. Navy conducted a health risk assessment. It is concluded that under current conditions the site is safe for humans because the cap continues to effectively prevent exposure to landfill gas and is protecting the groundwater. Based upon this, the site meets the objective of the CERCLA final site remedy. As a result, the U.S. Navy, in conjunction with GEPA, recommends that the previously conducted cleanup (capping, storm water and landfill gas

control and fencing) and the following additional measures serve as the final remedy for the CB Landfill:

- Apply land use controls including fencing (already in place) to restrict public access and provisions in the Navy's master planning documentation to prevent future use that may damage the impermeable cap.
- Continue long-term inspection and maintenance to insure that the existing impermeable cap system, drainage ditches and fence are in good working condition in the future.
- Continue periodic monitoring of groundwater at the upgradient U.S. Navy water supply wells and the downgradient coastal springs.

Community Participation

The public is invited to comment and ask questions about the recommended final remedy presented in this Proposed Plan at the Restoration Advisory Board (RAB) meeting. Representatives from the U.S. Navy and GEPA will be present to discuss the results of the alternative selection process, and to answer any questions about the CB Landfill.

The U.S. Navy, in cooperation with GEPA, will select the final remedy for the CB Landfill only after considering public comments. The U.S. Navy may modify the recommended final remedy, or select an alternate final remedy based on public comments or new information.

A Decision Document will be issued to respond to public comments, and to document the rationale for the final remedy chosen for the CB Landfill.

Location of Information Repository:

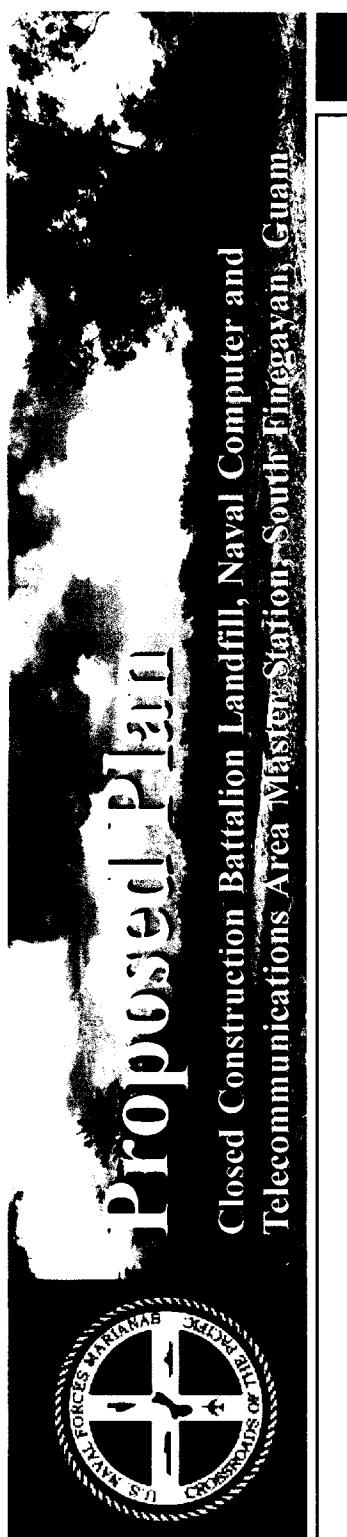
The documents describing all actions taken during the investigation and cleanup of the CB Landfill are available for your review at the following location:

Nieves M. Flores Memorial Library

254 Martyr Street
Hagatna, Guam 96910

Phone: (671) 475-4751, 4752, 4753, or 4754
Hours: Mon., Wed., Fri.: 9:30 A.M.-6:00 P.M.
Tues., Thurs.: 9:30 A.M.-8:00 P.M.
Sat.: 10:00 A.M.-4:00 P.M.
Sun.: 12:00 P.M.-4:00 P.M.

Contact: Cil Orot



Proposed Plan

Closed Construction Battalion Landfill, Naval Computer and Telecommunications Area Whistler Station, South Finegayan, Guam

Landfill South Finegayan, Guam. Honolulu. Pacific Division, Naval Facilities Engineering Command. April 24. EnviroNet. 2003. Post-Removal Action Monitoring, May through November 2002 Construction Battalion Landfill, South Finegayan, Guam. February.

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Naval Energy and Environmental Support Activity (NEESA). 1983. United States Navy Assessment and Control of Installation Pollutants, (IAS) of Guam Naval Complex, Vol. II – Outlying Activities.

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_____. 1996. Engineering Evaluation and Cost Analysis (EE/CA) for Construction Battalion Landfill Removal Action U.S. Navy Public Works Center, Guam. February. OHM Remediation Services Corp. 1999a. Final Remediation Verification Report (RVR) Construction Battalion Landfill Removal Action. July.

_____. 1999b. Final General Site Work Plan Groundwater Monitoring Program, Construction Battalion Landfill Removal Action, Public Works Center, South Finegayan, Guam. April.

TELL US WHAT YOU THINK



Attend the Public Meeting



Submit Written Comments

Public Comment Period:
June 12 - July 12, 2003

Written comments should be directed to the Navy Remedial Project Manager. Written comments must be postmarked by:
July 12, 2003.

The public comment period may be extended up to an additional 30 days by submitting a request for extension in writing to the Navy by: **July 5, 2003.**

GLOSSARY

ARAs: Applicable or Relevant and Appropriate Requirements; the federal and state environmental laws that a selected remedy will meet.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): Also known as Superfund, CERCLA is a federal law that regulates environmental investigations and cleanup of sites identified as possibly posing a risk to human health and the environment.

Engineering Evaluation and Cost Analysis (EE/CA): A document that is used to evaluate the effectiveness, feasibility and cost for cleanup alternatives.

Proposed Plan: A document that reviews the remedy alternatives, summarizes the recommended remedy, explains the reason for its selection, and requests public comment.

Remedial Investigation: An assessment performed to determine the nature and extent of contamination at a site and the risks posed by the presence of that contamination.

RCRA: Resource Conservation and Recovery Act; A law passed in 1976 giving EPA the authority to control the management of hazardous, solid, and medical waste.

Risk Assessment: A study conducted as part of a remedial investigation that describes the risk posed to public health and the environment due to exposure to contaminants present in air, soil, surface water or groundwater at the site.

REFERENCES

Department of the Navy. 1996. *Action Memorandum, Subject: Removal Action at Construction Battalion*

Closed CB Landfill, South Finegayan, Guam*

Landfill South Finegayan, Guam. Honolulu. Pacific Division, Naval Facilities Engineering Command. April 24.

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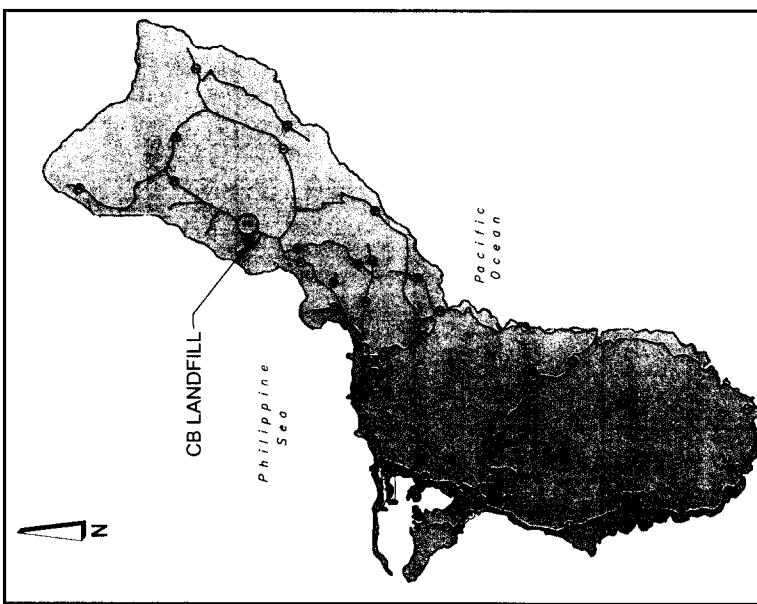
period from June 12 to July 12, 2003. Comments and questions are also encouraged during the public meeting on June 19, 2003.

Background and Site Characteristics

The CB Landfill is located at the Naval Computer and Telecommunications Area Master Station (NCTAMS) Finegayan, Guam, on the south side of Coral Tree Drive east of Royal Palm Drive (Figure 3). This portion of the NCTAMS facility is operated by Public Works Center, and will remain U.S. Government property. The area of the CB Landfill is presently vacant, except for storm water drainage structures and a perimeter chain-link fence and gate.

The U.S. Navy opened the CB Landfill in 1944, and it remained in operation until 1957, primarily for the disposal of wastes from the nearby CB maintenance shop. Wastes placed into the landfill reportedly consisted of construction debris, domestic refuse, scrap metal, petroleum oils and lubricants, and solvent waste.

Figure 1: Site Location Map



The 1998 cleanup was performed under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Removal Authority, in accordance with the Superfund Accelerated Cleanup Model.

The U.S. Navy is issuing this Proposed Plan as part of its public participation responsibilities under CERCLA. Written comments are encouraged during the public comment



Figure 2: Capped CB Landfill



Figure 4: Landfill cover system installation during the cleanup

Engineering Evaluation/Cost Analysis - 1996

The Navy prepared an Engineering Evaluation and Cost Analysis in 1996 to evaluate various cleanup alternatives for the CB Landfill.

The objective of the cleanup was to assure that people and the environment wouldn't come in to contact with rubbish. Specifically, the selected cleanup alternative needed to provide long-term protection for humans and the environment by:

1. Preventing direct contact with surface soil and buried landfill rubbish.
2. Preventing storm water from percolating down through the soil and buried rubbish and generating a contaminated fluid called "leachate", which could seep down into the groundwater beneath the landfill.

Cleanup Alternatives Considered

The following cleanup alternatives were considered for the CB Landfill:

1. Perimeter Fence
2. Impermeable Containment System

3. Resource Conservation and Recovery Act Subtitle D Containment System
4. Waste Removal

The alternatives were evaluated using the nine U.S. Environmental Protection Agency cleanup criteria (Table 1). The evaluation process judged each cleanup alternative on its ability to achieve the cleanup objective.

Table 1: Nine Criteria for Evaluating Cleanup Methods

1. Overall Protection of Human Health and the Environment
2. Compliance with Applicable or Relevant and Appropriate Requirements
3. Short-Term Effectiveness
4. Long-Term Effectiveness and Permanence
5. Reduction of Toxicity, Mobility, or Volume through Treatment
6. Implementability
7. Cost
8. State/Territory Acceptance
9. Community Acceptance

Proposed Plan

Selected Cleanup Alternative

Alternative 2 consisted of installing an impermeable cap over the landfill refuse (shown on Figures 4 and 5), providing storm water and landfill gas control, and installing a perimeter fence. The landfill cap consists of a waterproof polyvinyl chloride (PVC) barrier and a vegetative soil cover. Surface grading and drainage ditches were used to channel storm

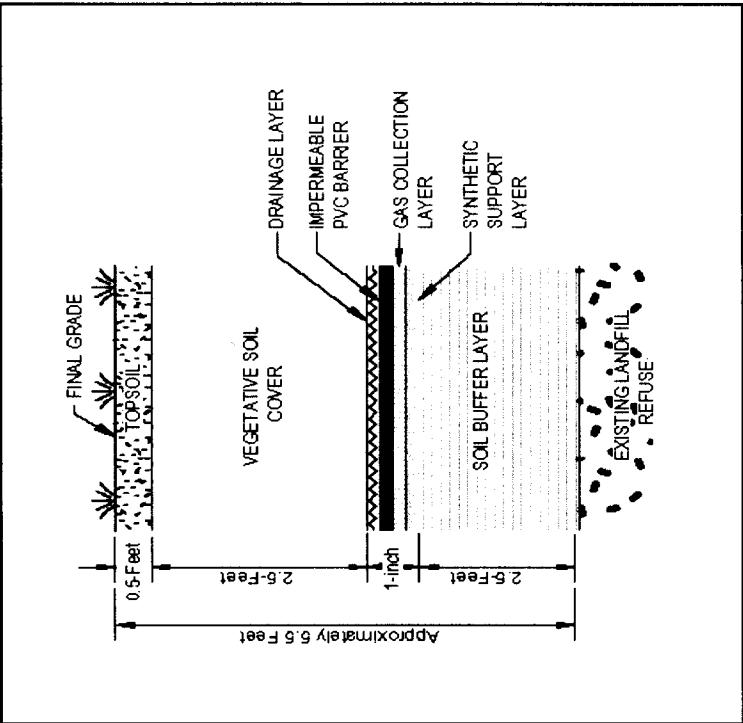


Figure 5: Landfill Cap System

water away from the landfill to a discharge location. Passive gas vents would prevent landfill gas from accumulating beneath the landfill cap system. The perimeter fence would restrict public access to the site.

This alternative was selected as the preferred alternative because it achieves substantial risk reduction by addressing the source material constituting the principal threat, costs less than the other alternatives that satisfy the cleanup objective, and was accepted by GEPA and the community.

Cleanup Completed

The U.S. Navy issued an Action Memorandum in 1996 to document the decision for cleanup at the CB Landfill.



Figure 6: Landfill Synthetic Support Layer Installation

The Action Memorandum acknowledged the potential site risks at the landfill, stated that the reason for the cleanup was to protect humans, plants and animals, listed the cleanup alternatives considered, identified the best cleanup alternative (Alternative 2), and provided the rationale for its selection.

The U.S. Navy, with concurrence from GEPA, performed the recommended cleanup at the CB Landfill in 1998. The cleanup included constructing a waterproof barrier cap over the top of the entire landfill refuse area (Figures 4 through 7), installing storm water and landfill gas control systems, and implementing a post-closure monitoring and maintenance program. A perimeter fence restricts public access to the site.



Figure 7: Landfill PVC Barrier Installation